II. Remarks

Claims 1-21 are amended herein. Support for the various amendments made to the claims herein may be found throughout the application as filed. See, for example, Figs. 1A and 1B, and paragraphs 4, 5, 6, 7, 8, 41, 51 and 64 of the specification of the present patent application as originally filed, where the effect of, and compensation for, temperature-induced variations in dark current are discussed in detail.

On September 24, 2007, an Office Action (hereafter "Office Action") was mailed rejecting all of the then-pending claims on the basis of U.S. Patent No. 5,329,111 to Sonoda et al., U.S. Patent No. 5,502,488 to Nagasaki et al., U.S. Patent No. 5,508,507 to Nelson et al.

The present Response and Amendment are submitted herewith in response to the Office Action.

III. Rejections of Claims Made in the Office Action

In the Office Action, the Examiner rejected claims on the following bases:

(1) Claims 1, 4, 6-9, 13-16 and 18-21 were rejected under 35 U.S.C. Section 102(b) as being anticipated U.S. Patent No. 5,329,111 to Sonoda et al. (hereafter "the Sonoda reference");

(2) Claims 2-3, 11-12 and 17 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over the Sonoda reference in view of U.S. Patent No. Patent 5,502,488 to Nagasaki et al. (hereafter "the Nagasaki reference") and further in view of U.S. Patent No. 5,508,507 to Nelson et al. (hereafter "the Nelson reference").

(3) Claim 5 was rejected under 35 U.S.C. Section 103(a) as being unpatentable over the Sonoda reference.

Each of the foregoing rejections is responded to below, where each response references the number corresponding to each rejection set forth above.

IV. Responses to Rejections Made in the Office Action

(1) Claims 1, 4, 6-9, 13-16 and 18-21 as amended herein are not anticipated by Sonoda.

Pertinent portions of the Sonoda reference cited by the Examiner include the following:

> An image reader which reads a printed image and converts it to an electric signal is known. Such a device is provided with a contrast adjusting function with which the user may freely control contrast to obtain the optimum picture according to the original. Thus, as illustrated in FIG. 6, color signals R, G and B from an image sensor 1 are amplified by amplifying circuits 2, 3 and 4 and sequentially switched by a selection circuit 11 which is supplied with a switching signal from a device not shown.
>
> Referring to FIG. 7, which is a specific embodiment of Fig. 6, the image sensor 1 outputs color signals R, G and B which are then independently amplified by amplifiers 2 to 4.
>
> Taking the R signal as an example, FIG. 10(a) shows the waveform of the output signal from the amplifier 2 which is obtained when the picture elements of the image sensor 1 are sequentially scanned. In the image sensor 1, the plural picture elements in the first scanning area and those in the last scanning area constitute unused areas which are not used in the reading of a document. Thus, the areas T1 and T3 in FIG. 10(a) represent unused picture elements and the area T2, exclusive of these areas, represents effective picture elements exposed to light. As seen from FIG. 10(a), the output voltage of the area not exposed to light is a dark voltage, which is lower than the output voltage of the effective picture elements. ***Representative of this dark voltage, a predetermined value, for example a value found by averaging, is memorized by a sample hold circuit 5 in response to a timing signal from a circuit not shown, and the signal shown in FIG. 10(b) is output.*** The output signal of the sample hold circuit 5 and the output signal of the amplifier 2 are differentially amplified in a different amplification circuit 8. As a result, a signal available on

subtraction of the dark voltage from the R signal is finally output as shown in FIG. 10(c).

The same applies to G and B signals, as shown in FIG. 7. Thus, the dark voltages of the respective color signals are memorized in sample hold circuits 6, 7 respectively, and subtracted from the color signals in differential amplification circuits 9, 10. The differential amplification circuit 8 comprises a differential amplifier 8a and resistors 8b through 8e, differential amplification circuit 9 comprises a differential amplifier 9a and resistors 9b through 9e, and differential amplification circuits 10 comprises a differential amplifier 10a and resistors 10b through 10e.

The output signals from the differential amplification circuits 8 through 10 are fed to a selection circuit 11, from which they are output in synchronism with selection signals supplied from a circuit not shown and converted to digital signals by and A/D converter 17.

The analog signal output of the selection circuit 11 is amplified by an amplifying circuit 12 with a gain predetermined according to a variable resistor 13 and converted to a digital signal in bits from a most significant bit (MSB) to a least significant bit (LSB) by the A/D converter 17. *U.S. Patent 5,329,111 to Sonoda et al., col. 1, lines 10-67.*

Figure 7 of the Sonoda reference is reproduced hereinbelow.

FIG. 7
PRIOR ART

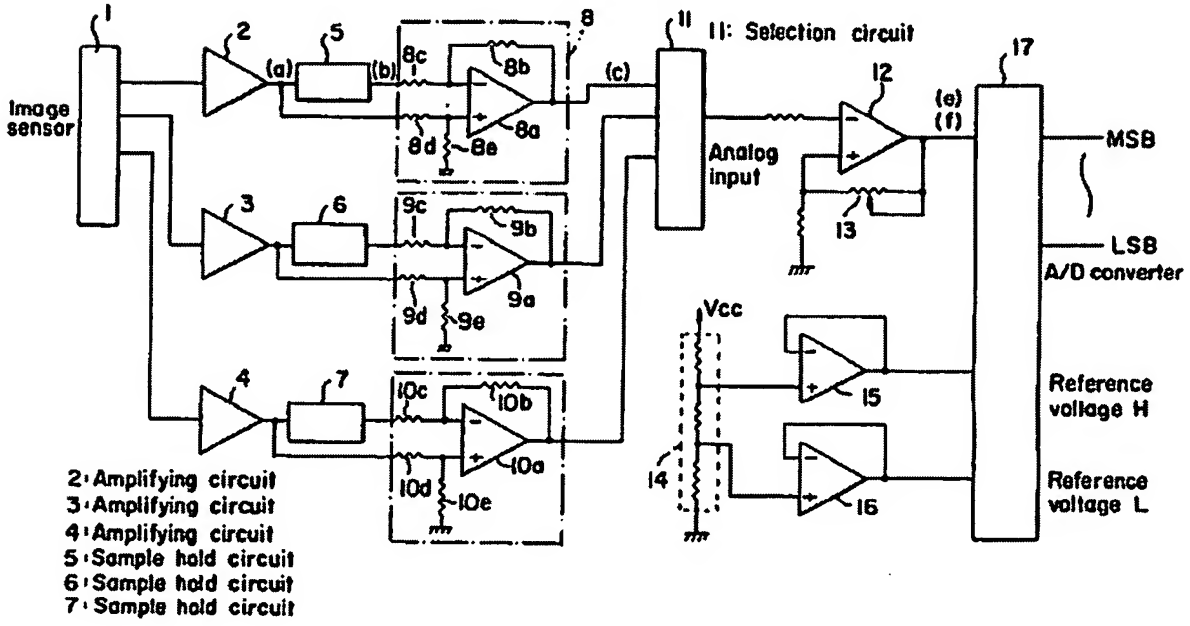


Fig. 7 of the Sonoda reference

Inspection of the above-cited portions of the Sonoda reference, as well as other portions thereof, shows that the Sonoda reference discloses subtracting from color signals ***predetermined*** values that represent dark voltages. There is no discussion, hint at or suggestion of subtracting dark voltages from color signals where such dark voltages are based on measurements obtained at an ambient temperature at which a color sensing circuit is operating. Likewise, there is no discussion, hint at or suggestion regarding fluctuations or variations of dark voltages with temperature, or compensating color signals for such fluctuations or variations.

It is axiomatic that for a reference to anticipate a claim, all elements and limitations recited in the claims must be found within the four corners of such reference. Inspection of claims 1 through 21 as amended herein shows that all such claims include limitations and elements directed to measuring dark photocurrents at the ambient temperatures at which a color sensing circuit is operating, and subtracting such dark color offset voltages from voltages corresponding to color components of light being measured at the same ambient temperature as the dark color offset voltages. Such elements and limitations are not disclosed, hinted at or suggested anywhere in the Sonoda reference, and accordingly the Sonoda reference does not anticipate any of claims 1 through 21 as amended herein.

(2) Claims 2-3, 11-12 and 17 as amended herein are not unpatentable over Sonoda in view of Nagasaki and further in view of Nelson under 35 U.S.C. Section 103(a).

Pertinent portions of the Sonoda reference are discussed in detail in Section IV(1) above.

Portions of the Nagasaki reference cited by the Examiner include the following:

> FIG. 16 shows an equivalent circuit of one pixel of a solid-state imaging device having such a structure. Drain electrode 7 of MOS transistor 5 is connected to output amplifier 11. This output amplifier 11 outputs a pixel signal made of the charge stored in the capacitor 10 of the pixel, out of an element, as an imaging signal by current-voltage conversion. *U.S. Patent No. 5,502,488 to Nagasaki et al., col. 6, lines 39-45.*

Fig. 16 of the Nagasaki reference is reproduced hereinbelow.

U.S. Patent Appln. Ser. No. 10/801,204 entitled "System and method for Canceling Dark Photocurrent in a Color Sensor" to Boon K. Tan et al..; Avago Technologies Attorney Docket No. 70040131-1; Woods Patent Law Docket No. P AVG 219.

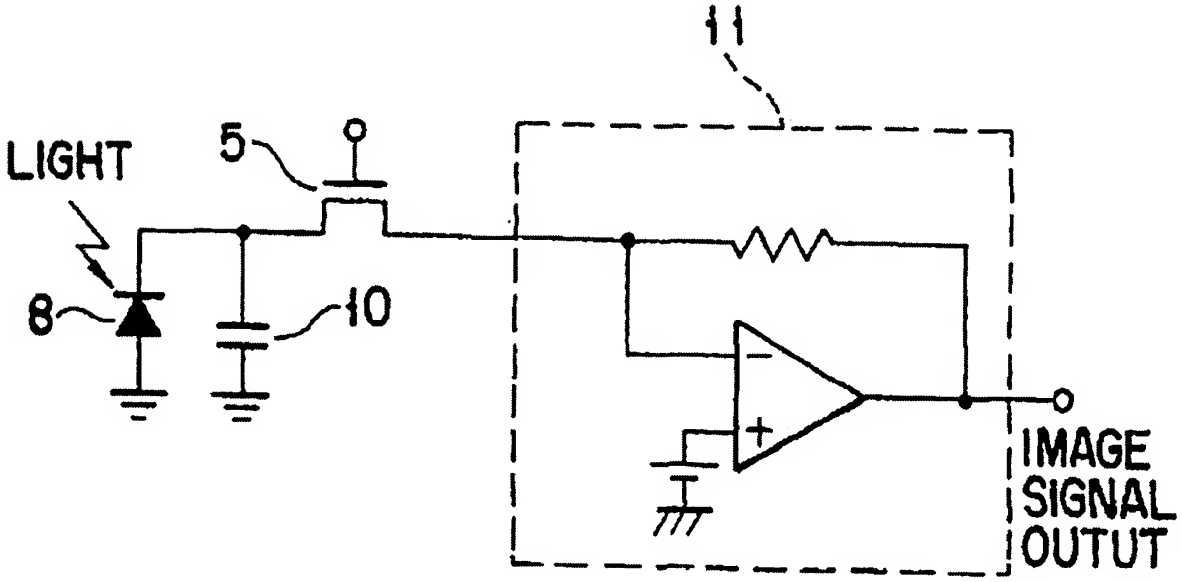


FIG. 16

Portions of the Nelson reference cited by the Examiner include the following:

> FIG. 3 shows an electrical diagram of circuit 50 for each of N channels. Circuit 50 is comprised of three combinations 51, 53, and 55 of circuit elements. First combination circuit 51 includes operational amplifier 52, which can be Burr-Brown OPA637, and feedback resistor 54, which can be 1.times.10.sup.7 ohms, connected in parallel with compensation capacitor 56, which can be 70 femto-farads. This combination of elements 51 serves as a trans-impedance amplifier which results in a conversion of current pulses into a corresponding voltage pulse.

Fig. 3 of the Nelson reference is reproduced hereinbelow.

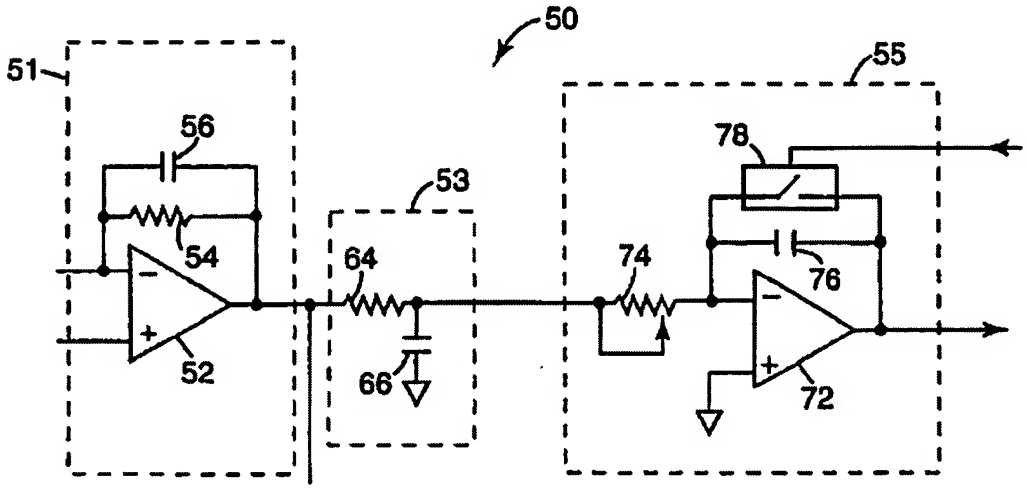


FIG. 3

Fig. 3 of the Nelson reference

Inspection of the above-cited portions of the Nagasaki and Nelson references, as well as other portions thereof, shows the following: The Nagasaki reference discloses a solid-state imaging device comprising a semiconductor substrate, where a plurality of pixels are formed thereon. Low impedance output amplifiers are provided for converting pixel signals to imaging signals, including amplifiers which include feedback resistors and positive and negative input terminals. The Nelson reference generally discloses an imaging system employing a photoconductive material capable of bearing a latent photostatic image, and more particularly discloses an operational amplifier 52 having a feedback resistor 54 connected in parallel with a compensation capacitor. There is no discussion, hint at or suggestion in the Nagasaki or Nelson references regarding subtracting dark voltages from color signals where such dark voltages are based on measurements obtained at an ambient temperature at which a color sensing circuit is operating. Likewise, there is no discussion, hint at or suggestion in such references regarding fluctuations or variations of dark voltages with temperature, or compensating color signals for such fluctuations or variations. Indeed, neither the Nagasaki reference nor the Nelson reference discloses anything at all regarding dark currents, or any of the problems attendant to the presence of dark currents in image sensing systems or devices.

Referring to the Sonoda, Nagasaki and Nelson references, it becomes clear that none of those references discloses several of the elements and limitations set forth in required by all of claims 1 through 21 as amended herein relating to compensating an output signal provided by a color sensing circuit for temperature-induced fluctuations or variations in the magnitudes of the dark currents associated therewith.

The Applicants have discovered that a certain novel combination of electrical, electronic and imaging components combined and configured in a certain order are required to produce the beneficial effects of the present invention. As demonstrated above, several of those components and configurations are neither disclosed nor suggested anywhere in the Sonoda, Nagasaki or Nelson references, alone or in combination, and accordingly cannot be prima facie obvious.

Merely asserting that "would be obvious to try" the invention by making reference to the subtraction of predetermined dark current values from color signals of Sonoda, the amplifier input configuration of Nagasaki, and the compensation capacitor configuration of Nelson, while essentially creating other claimed elements out of whole cloth without referring to any specific portions of the cited references to establish a motivation for combining elements or functionality disclosed therein, does not establish a *prima facie* case of obviousness.

There is no incentive, teaching or suggestion in the Sonoda, Nagasaki or Nelson references to produce the invention now recited in claims 1 through 21. The mere fact that the cited Sonoda, Nagasaki and Nelson references could, with the benefit of hindsight, produce something vaguely similar to the present invention does not make the modification obvious, or suggest the desirability of the modification required to arrive at the present invention. Indeed, this conclusion is buttressed by the fact that several elements and limitations are missing in the Sonoda, Nagasaki and Nelson references in respect of claims 1 through 21 as amended herein.

It is well settled that a motivation to combine elements or limitations disclosed in disparate references must be found within the references themselves or from pertinent sources of extrinsic information, and that such a motivation does not arise, as here, by merely identifying a collection of disparate piece parts in a combination of references, and then asserting it would have been obvious to take such disparate elements and limitations and add many others thereto to arrive at the presently claimed invention.

There is no suggestion of what direction any experimentation should follow in the Sonoda, Nagasaki and Nelson references to obtain the invention now recited in claims 1 through 21. Accordingly, the result effective variables, for example measuring variations in dark current induced by changes in ambient temperature as those changes occur and compensating for such variations in real time in measured color intensity signals, are not known to be result effective. Thousands or millions of attempts at variations might be made before arriving at the desired improvement. Thus, to say that it would be obvious to read the Sonoda, Nagasaki and Nelson references and somehow arrive at the invention now recited in claims 1 through 21 is clearly not be the test for obviousness.

The foregoing analysis also makes it clear that there is no basis in the art for modifying the teachings of the Sonoda, Nagasaki and Nelson references to arrive at the invention now recited in claims 1 through 21. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some reason such as a teaching, suggestion or incentive supporting the combination. The Sonoda, Nagasaki and Nelson references do not teach the problems associated with compensating for variations in dark current induced by changes in ambient temperature in an imaging system,.

When, as here, the prior art itself provides no apparent reason for one of ordinary skill in the art to make a modification or to combine references, an argument clearly does not exist that the claimed subject matter would have been obvious. Thus, an attempt to use the applicants' own disclosure as a blueprint to reconstruct in hindsight the invention now recited in claim as amended herein out of isolated teachings appearing in the prior art is clearly be improper.

The results and advantages produced by the invention set forth in claims 1 through 21 as amended herein, and of which the cited Sonoda, Nagasaki and Nelson references are devoid, cannot be ignored simply because the claim limitations might be deemed similar to the otherwise barren prior art.

The foregoing analysis also makes it clear that many limitations appearing in claims 1 through 21 as amended herein are not present in the Sonoda, Nagasaki and Nelson references. When evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. Under §103, the Examiner cannot in turn dissect claims 1 through 21 as amended herein, excise the various individual elements recited in the claims, and then declare the remaining portions of the mutilated claims to be unpatentable. The Examiner must follow the basic rule of claim interpretation of reading the claims as a whole. Accordingly, the Sonoda, Nagasaki and Nelson references may not properly be use as a basis for rejecting claims 1 through 21 as amended herein under §103.

Finally, the function, way and result provided by the devices and methods disclosed in the Sonoda, Nagasaki and Nelson references are completely different from those provided by the presently claimed invention. The devices disclosed in the Sonoda reference require that predetermined dark current values be estimated or determined, saved in a

memory, and then subtracted from color signals. The temperature dependence of dark current is completely ignored in the Sonoda reference. In addition, dark current values employed in the Sonoda reference are based on estimates rather than actual values, and such estimates are not contemporaneous with any measurements of dark current. No dark currents are measured or otherwise evaluated in the Nagasaki or Nelson references. Thus, the devices and configurations employed in the Sonoda, Nagasaki and Nelson references, and the results provided by such devices and configurations disclosed in the Sonoda, Nagasaki and Nelson references have virtually nothing in common with those of the presently-claimed invention other than the fact that in one reference a non-contemporaneous estimate of dark current is employed. Such opposing functions, ways and results establish yet further that the presently-claimed invention is not *prima facie* obvious over the Sonoda reference in view of the Nagasaki reference, and further in view of the Nelson reference.

For all the foregoing reasons and more, the presently claimed invention is not *prima facie* obvious over the Sonoda reference in view of the Nagasaki reference, and further in view of the Nelson reference.

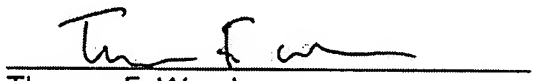
(3) Claim 5 as amended herein is not unpatentable over Sonoda under 35 U.S.C. Section 103(a).

While the Examiner is indeed correct that it is well known in the art to set a resistor value of a feedback resistor in a differential amplifier to approximate the resistance of a feedback resistor, such is not well known in the context of a color sensing circuit. Moreover, claim 5 is substantively amended herein to distinguish it over the Sonoda reference, and now includes multiple limitations and elements that are nowhere to be found in the Sonoda reference. Thus, all the arguments set forth above in Sections IV(1) and IV(2) above regarding the lack of anticipation and unobviousness of claims 1-4 and 6-21 also apply to claim 5 as amended herein, and thus claim 5 is not obvious over the Sonoda reference.

V. Summary

Claims 1-21 as amended herein are pending in the present application, and are believed to be in condition for allowance. Examination of the application as amended is requested. The Examiner is respectfully requested to contact the undersigned by telephone or e-mail with any questions or comments he may have.

Respectfully submitted,
Boon Keat Tan et al.
By his attorney



Thomas F. Woods
Registration No. 36,726

Date: 12-25-07

Woods Patent Law
P.O. Box 2528
Lyons, Colorado 80540-2528
Tel: (303) 823-6560
Fax: (303) 823-6594
E-mail: tom@woodspatentlaw.com